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Project for a Europe-Africa fixed link through the Strait of Gibraltar: report on activities carried out during the period 2006-2013 and programme proposed for the period 2013-2015

Note by the Secretary-General

1. The Secretary-General has the honour to transmit to the Economic and Social Council the report prepared in accordance with Council resolution 2009/11 of 28 June 2009 by the Executive Secretaries of the Economic Commission for Europe and the Economic Commission for Africa on the activities carried out within the framework of the project for a Europe-Africa fixed link through the Strait of Gibraltar.

2. The Council has been interested in this project since 1982, following the decision taken by the Governments of Morocco and Spain within the framework of a bilateral agreement on cooperation adopted on 24 October 1980 for the joint study of the feasibility of the project. Since that time, the Council has regularly requested the two regional commissions to follow the development of the project studies and keep it informed in that regard.

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Project for a Europe-Africa fixed link through the Strait of Gibraltar: report on activities carried out during the period 2006-2013 and programme proposed for the period 2013-2015

Summary

The present report summarizes the work done under the authority of the Spanish-Moroccan Joint Committee by the two engineering firms Sociedad Española de Estudios para la Comunicación Fija a través del Estrecho de Gibraltar (SECEGSA) and Société nationale d'études du détroit de Gibraltar (SNED), in connection with the fixed-link project.

The period 2006-2013 was devoted to updating the project's feasibility phase and undertaking an overall evaluation. It involved:

- Updating the tunnel studies on the basis of site data gathered during the previous phase and establishing the environmental impact of the project
- Revising tunnel traffic estimates and analysing the economic and financial situation of the project in the light of updated traffic data and construction costs; establishing the socioeconomic impact on the States of the region and determining related regulatory, legal and support measures connected with construction and operation
- Presentation of the project to the Euro-Mediterranean Transport Forum meeting held in Brussels on 30 May 2007; the Forum included it among its priority projects for the region
- Presentation of the project to the European Commissioner for Transport by the Ministers of Transport of Morocco and Spain, in order to seek European Union financial and political support for the link and for southward rail extensions, at a dedicated meeting held in Luxembourg on 8 June 2007
- Presentation of the project at the TEN-T Days held in Naples on 21 and 22 October 2009
- Preparation of a multipoint, comprehensive evaluation report by specialist consultancy firms

Studies in 2013-2015 will consist of investigation and research aimed at reducing uncertainties and building knowledge in order to establish a sound basis for reaching a decision on the option with the best probability of technical, economic and financial feasibility.

I. Introduction

1. In its resolution 2011/12 of 25 July 2011, the Economic and Social Council requested the Executive Secretaries of the Economic Commission for Africa and the Economic Commission for Europe to continue to take an active part in the follow-up to the project studies on a Europe-Africa fixed link through the Strait of Gibraltar and to report back to the Council at its substantive session of 2013.

2. The purpose of the present report, prepared jointly by the two regional commissions on the basis of information obtained from the two companies responsible for carrying out the project studies, is to respond to the provisions of the aforementioned resolution. The report includes, first, a summary of activities undertaken from 2006 to 2013 and, second, a summary description of the principal activities to be undertaken between 2013 and 2015 to advance the project.

3. It will be recalled that the studies for this project are taking place within the framework of the bilateral agreements signed by the Governments of Morocco and Spain, respectively, on 24 October 1980 and 27 September 1989, whereby the two parties agreed to study jointly the feasibility of the project for a fixed link through the Strait of Gibraltar on the basis of an equal sharing of costs, under the authority of a permanent intergovernmental Joint Committee, with the help of two State engineering companies, namely the Sociedad Española de Estudios para la Comunicación Fija a través del Estrecho de Gibraltar (SECEGSA), whose head office is in Madrid, and the Société nationale d'études du détroit de Gibraltar (SNED), whose head office is in Rabat.

4. After several stages beginning in 1980, the study process has been focused, since 1996, on the basic option consisting of a rail tunnel driven beneath the sill of the strait, comprising two unidirectional rail tubes connected to a central service and safety tunnel. The functional design, which is similar to that of the Channel Tunnel, allows for the interconnection of the two countries' railway networks and, in addition, the crossing of road vehicles on shuttle trains running between two terminal stations, one in Spain and the other in Morocco. Typical lengths for the structure in its current form would be 42 kilometres between terminals, 37.7 kilometres of which would be tunnel, including 27.7 kilometres of undersea tunnel. This basic option, identified in 1996, was subject to a preliminary pilot project, revised in 2007 in the light of newly acquired geological and geotechnical data, and was then evaluated within the framework of an overall evaluation of the project.

5. Owing to technical and economic considerations, and subject to the results of the studies on the development of relevant aspects of the basic option, the construction process in principle envisages the excavation of a 17-kilometre undersea exploratory gallery from the Moroccan side. This is needed to establish the exact nature of the geology in the area, determine the best construction method and refine the cost and timeline forecasts for tunnel construction. The boring will require the development of a detailed preliminary pilot project based on new geotechnical data that are yet to be collected.

6. At the current stage of exploration, there are still uncertainties about both the geometrics of the palaeochannels and the geomechanical properties of their formation. Considering the size and exceptional nature of the project, a more extensive programme of additional exploration and studies is needed. It should be

remembered that similar projects routinely require geological and geotechnical exploration representing 4-5 per cent of construction costs.

II. General geostrategic context

7. Given its strategic geographical position, the size of the investment and the complexity of implementation, it is clear that much more is at stake than merely a cross-border transport construction project traversing a strait and that the project's full implications can be grasped only in the light of its geostrategic context.

8. In terms of its impact on Morocco and Spain, the fixed link will benefit plans for the development of their high-speed rail and highway transport networks. Linking these networks together would enable them to expand and diversify the service offering, ensure continuity of service and shorten the crossing time. It could lead to the emergence of significant demand for transport.

9. In terms of its local impact, the project is part of a much broader regional development framework involving the ports in particular. The ports of Tanger-Med and Algeciras are currently undergoing expansion and adding capacity, seeking a strategic position in the international transport network. The project will add value to and complement these port facilities and could become a real spur to local development. Thus, it could also serve as a catalyst for the ongoing development of the Moroccan economy, from which Spain could also benefit, if strategic accompanying measures are put in place.

10. In terms of its impact at the transcontinental level and for the Mediterranean region, the project will provide a strong, continuous and permanent link between transport systems. The position of the fixed link at the gateway to the Mediterranean will make it an intercontinental hub. It will increase development potential by becoming a world-class logistical platform through its integration into the trans-European and North African transport networks and their extension into neighbouring regions and countries.

11. This outlook is in line with the main objectives of Euro-Mediterranean transport policy under various cooperation programmes, including the Regional Transport Action Plan for the period 2007-2013 approved in Brussels in May 2007 by the Euro-Mediterranean Transport Forum and the programme of the Union for the Mediterranean, which emphasize the importance of transport development in the region.

12. In conclusion, the project's geostrategic component and the development potential of mass transport networks using long-distance railway links weigh heavily in favour of its implementation and the involvement of the international community.

III. Activities carried out during the period 2006-2013

13. The studies and exploration conducted have examined:

(a) The physical environment;

(b) The engineering aspect;

(c) The socioeconomic environment;

(d) The establishment of a documentary database;

(e) The overall evaluation of the project.

The physical environment

14. The activities carried out in the physical environment comprise:

- Updating of the physical map of the Strait of Gibraltar
- Geodetic measurements on the two shores of the Strait and the establishment of new permanent Global Positioning System (GPS) stations in Tarifa and Tanger
- Updating of geological maps and data for the north and south shores
- Follow-up of experimental work at Tarifa
- Additional geotechnical tests on flysch and breccia
- Measurement and prediction of sea currents in the Strait, and
- Seismic and seismotectonic studies

15. The undersea drilling campaigns already completed benefited from several innovations that led to improved survey results for each campaign and the development of expertise that can be put to use in the future. The last drilling campaign (2005) reached significant drilling depths of around 325 metres below the seabed in a body of water 275 metres deep. The drilling campaigns (1997, 1999 and 2005) revealed a sand lens at a depth of 100 metres and two paleochannels filled with breccia in the middle of the strait at a depth of over 600 metres below sea level, making it necessary to tunnel through the breccia.

16. The available information about the geological conditions and geomechanical properties shows that drilling through the centre of the Strait (the two palaeochannels) could be extremely difficult.

The engineering aspect

17. The activities carried out in the area of engineering comprise:

- Updating of the preliminary pilot project for the basic option and the environmental impact study
- The operation study
- Further study of the geomechanical properties of the breccia, and
- Follow-up regarding the development of tunnel boring n chines

18. The current project (dual-tube with or without a service/safety tunnel) has the following features:

- Implementation in two phases in order to reduce investment costs
- An operating system designed to handle gradients of 30 per cent over 17 kilometres
- Dead-end terminals

- Use of open railway equipment, and
- A secure stopping area

19. The project also provides for the prior excavation of an undersea exploratory gallery which would be converted into a smoke extraction gallery during actual implementation of the project. Its construction should be conceived as part of the survey and exploration process intended to establish whether or not the project is technically feasible.

20. The environmental impact study for the project was carried out in accordance with generally accepted regulations (on terminals, ramps, roads, railways and other access and power infrastructure). The study lists the sources of impact and identifies and assesses the environmental effects of the pre-construction phase (including wastewater treatment, and transport and disposal of aggregates for concrete and excavated material) and the construction and operation phases (including the impact of the ramps on any groundwater, tunnel ventilation and air venting, drainage of the terminals, and venting of hot air from a tunnel cooling system). In areas where the project outline is sufficiently detailed, there is in-depth analysis of the related aspect.

The socioeconomic environment

21. The activities carried out in the socioeconomic environment comprise:

- The traffic-forecasting model
- The economic and financial evaluation
- The regional effects study, and
- Monitoring by the traffic and socioeconomic data observatory, whose 2012 statistical report is of particular note

22. The socioeconomic studies are the result of analysis conducted using high-quality tools. In particular, given the volume of data and the fact that studies began in 1982, it has been possible to draw up a chronology spanning more than 20 years.

23. The project is more than just a technical challenge or infrastructure linking two continents; it also entails services offered to a large, transnational body of users. It is therefore essential to accurately define the transport offering and demonstrate its benefits, because potential users could end up confusing the project with the services offered.

24. The analysis of mega-projects carried out in the regional effects study provides clear examples of the benefits of projects of this size and the institutional entities that have participated in sponsoring such projects internationally. The necessary accompanying measures will rely on a variety of participants, ranging from municipalities for the creation of designated development areas (such as the mixed development zone in Calais and the new Ørestad district in Copenhagen) to the European Commission, to map out Euroregions in the areas surrounding cross-border facilities.

Establishment of a documentary database

25. By systematizing the information gathered by the companies responsible for the project and making it available for electronic consultation, it is possible to ensure its dissemination to the international scientific community.

Overall evaluation of the project

26. The objective of the overall evaluation was to produce a report on the evaluation of the project as a whole and its feasibility, providing an in-depth analysis of its technical characteristics, the phases of its implementation, elements of socioeconomic and environmental evaluation and the costs and time frame for its construction. Future actions to advance the project are proposed.

27. Against a backdrop of growth in trade in goods and services and increased international mobility, the project will affect a huge intercontinental area of Europe and Africa beyond the immediate vicinity of the facilities. It will serve as a strategic hub in a process of regional economic integration that will ultimately contribute to sustainable development, peace and stability in the region.

IV. Involvement of institutional actors

28. Economic and Social Council decisions and resolutions have already led to the involvement of institutional actors in the development of the project. This initiative should be pursued and, at a relatively early stage before the specific features of the project are defined, should be extended to all potential partners that might become involved in the project itself or in a related aspect.

29. The process of consultation and of involving international actors in decision-making should be paralleled by a process of involving those actors in sponsoring the project, especially in financial terms. The project's major geostrategic implications fully justify such an approach, with partners' right to a voice in directing the project being naturally coupled with a duty to provide it with support.

30. The European Union, to which the project has been referred, will be one of the leading partners, if only because North Africans living in Europe, who make up a large percentage of the facility's potential users, are European Union taxpayers, and the bulk of goods travelling through the tunnel would come from Europe. For that reason, the complexity of the project and its economic and financial impacts transcend the bilateral framework of the two instigating countries.

V. Future activities for 2013-2015

31. The ultimate goal is to identify and analyse in greater depth an option with a reasonable probability of technical feasibility that respects the time frame set out. This analysis should result in the establishment of a list of actions intended to reduce uncertainties and consolidate costs for the duration of the project, thus providing a solid basis for decision-making.

32. The upcoming stage of the programme will provide global visibility for management of the project's development and will give decision makers a more accurate idea of the construction costs and timelines for the components of the facility. This will require the investment of greater sums for both exploration and

studies, with the aim of providing a level of understanding and findings that will allow decisions to be taken on future stages. This strategy will help decision makers progressively reach a conclusion as to the feasibility of the project. It comprises various elements as set out below:

A. Additional exploration

33. The next undersea drilling campaign consists of performing an optimal number of deep drilling surveys in the central area of the sill of the strait using drilling techniques already tested in the Strait of Gibraltar and improved and developed to meet not only geological goals — particularly to determine the exact boundaries of the paleochannels and the clay breccia within them — but also and more importantly, geotechnical goals.

B. Resumption of technical studies

34. The purpose of resuming the technical studies is to review the technical options for the project through more in-depth and objective analysis of the technical scenarios that might be considered and the geotechnical and baseline construction scenarios for tunnelling the undersea exploratory gallery, which will entail a substantial investment. This will provide tools that will improve the chances of successful construction relative to what might be envisaged based on available data.

C. Operation and capacity

35. The aim is to develop and study further, under various scenarios, the parameters (in terms of technical design, phasing, performance, mode of operation and costs) of a competitive service offering that will enable the project to play its role as a "strong link" between Europe and Africa and to capture the traffic potential shown in the traffic-forecasting model.

D. Definition of services offered

36. The project is more than just a technical challenge or infrastructure linking two continents; it also entails services offered to users. The definition of the services offered is closely linked to the operation and capacity study mentioned above.

E. Safety studies

37. The safety studies conducted to date should be enhanced by considering, among other things, factors pertaining to the optimal operation of the structure.

F. Risk management

38. Risk analysis must be considered as a decision-support tool within the wider project management framework. As overall risk is the sum total of individual risks or types of risk, aspects of the project that could create or reveal significant risks need to be analysed carefully.

G. Greenhouse gas inventory

39. Given the current mood of the international community and demands in the area of environmental protection, an inventory of greenhouse gases should be taken by estimating emissions generated by implementation of the project (including work and operation) and emissions avoided by the choice of rail transport over road transport. The objective is to identify and quantify, using available data, emissions generated directly by or attributable to the project at its different stages, in order to establish a carbon footprint.

H. Baseline socioeconomic scenario and definition of variants

40. As the project has a major impact on the macroeconomic and demographic situations of the adjoining regions, the socioeconomic scenarios should be established by area, according to the divisions set out in the traffic-forecasting model. The final reference scenarios chosen will be developed from forward-looking and logistical studies based on different variants of the reference scenario, by measuring the direct, indirect and incidental impacts of the project on economies.

I. New simulations with the traffic-forecasting model

41. New traffic simulations will be performed based on the aforementioned socioeconomic scenarios and an improved method of calculating traffic generated, using the existing traffic-forecasting model.

J. New socioeconomic evaluation

42. The new analysis is made possible by a more thorough evaluation of the status of the project through the recommended studies, including the operation study (operation diagram, impact on operation of Spanish and Moroccan high-speed rail lines, rolling stock needed, operation of trains to estimate the rolling stock, capacity, etc.).

K. Resumption of financial evaluation

43. While the financial simulations model (projected financial statements: balance sheet, income statement and cash flow statement) used is well structured and acceptable, the results presented cannot be considered conclusive, given the approximations contained in the assumptions and data of the model. A new analysis should therefore be conducted based on consistent assumptions, taking into consideration the new components of the cost of the project, while bearing in mind that long construction timelines cause legal and institutional difficulties requiring very specific financial arrangements, which still lack visibility, and that multiple-option financial models will have to be developed for these financial arrangements.

L. Legal and financial arrangements

44. The financial analysis should include an evaluation of several alternative legal and financial arrangements, not only a concession arrangement. Several alternative institutional and financial scenarios are possible, all covering risk-sharing between the public and the private sectors.

M. Legal and institutional study

45. The creation of new infrastructure will require the coordinated effort of many authorities at the international level through agreements between the two instigating countries, at the national level within the countries involved, and at the regional and local levels. An institutional study will be needed to determine the measures to be considered in order to set up and manage the legal and financial arrangements outlined in the financial study.

N. Accompanying measures

46. Accompanying measures are vital to the success of the project and, because they will determine its economic stability, they may even determine whether or not it is implemented. Studies of mega-projects have demonstrated that accompanying measures can determine the ability or inability of any project to spur economic and social development in adjoining regions.

VI. Conclusions

47. The overall objective of these activities is to identify and analyse in greater depth an option with a reasonable probability of technical feasibility that respects the time frame set out. This analysis should result in the best possible construction plan and the establishment of a list of actions intended to reduce uncertainties and consolidate costs for the duration of the project, thus providing a solid basis for decision-making.

48. The objectives of the programme with regard to the physical environment are to:

- Conduct a deep-sea offshore drilling campaign using in situ geotechnical tests, should they prove feasible, and laboratory tests for samples that will be carefully collected, preserved and stored under good conditions, thereby making it possible to:
  - improve the geotechnical characterization of the clay breccia
  - determine the extent of the paleochannels, along the tunnel route, and
  - verify that there are no sand lenses along the tunnel route, at least in the areas drilled
- Carry out various types of geodetic work on the two shores, and
- Perform seismic and seismotectonic work in the environment of the Strait of Gibraltar, bearing in mind that it constitutes the point of lithospheric convergence between the African and Eurasian tectonic plates and the Alboran subplate

49. The objective of the engineering and environmental activities is to prepare a new preliminary pilot project for the tunnel option, in order to:

- Consolidate the technical feasibility of the structure in general, and in particular the undersea exploratory gallery, in the light of the geotechnical data that will be generated from future under-sea campaigns and experimental work
- Review the criteria for the design of the tunnel to make it more attractive and competitive vis-à-vis other modes of transport, and
- Conduct an environmental assessment, which should include the greenhouse gas inventory, identifying the sources of impact of the different phases of the project and preventive, compensatory and mitigation measures, in accordance with international environmental protection standards

50. The objectives of the socioeconomic activities are to:

- Highlight the role of the project as an ideal logistical platform for trade development in the region
- Determine an attractive service in terms of technical design, phasing, performance, mode of operation and costs, and
- Conduct an economic and financial evaluation by estimating the traffic generated, establishing appropriate financial scenarios and analysing the overall risk of the project

51. Based on the elements mentioned above, the technical feasibility study, the financial and economic evaluation, and the environmental evaluation should yield results that will make it easier to reach a decision on the prospects for developing a project of such magnitude.